Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

Supplement to: Magnus MC, Gjessing HK, Eide HN, et al. Covid-19 vaccination during pregnancy and first-trimester miscarriage. N Engl J Med. DOI: 10.1056/NEJMc2114466

Table of contents **Page**

Supplementary Methods

Data sources and linkages

The Norwegian national health registries in this study contain registrations of all contacts with health care services, which are mandatory to report, and linked to reimbursement. Diagnostic codes and dates of contact are registered for each individual with a personal identification number (pin), which is issued to all citizens in Norway at birth or immigration for identification and administrative purposes. The pin enables linkages of individual level information across registries. All data were provided by the Covid-19 Emergency Preparedness Register run by the Norwegian Institute of Public Health and were deterministically linked using unique personal identification numbers.

The Emergency Preparedness Register for Covid-19[1]

Data in this study were provided through the Emergency preparedness register for Covid-19 ("Beredt C19") administered by the Norwegian Institute of Public Health, according to the Health Preparedness Act §2-4. This registry was established in 2020 to provide authorities with up to date information on prevalence, causal relationships, and consequences of the Covid-19 epidemic in Norway. "Beredt C19" includes information already collected in the healthcare system, national health registries and administrative registers with information about the Norwegian population. The data subjects' right is safeguarded as they can contact the data controller for the different sources included in "Beredt C19" in the usual way this is regulated in Norway.

Through "Beredt C19" we used data from the following sources:

The Norwegian Immunisation Register (SYSVAK)

SYSVAK is a register of vaccines in the Norwegian vaccination program, with mandatory registrations of all Covid-19 vaccinations (dates and type of vaccine).

The Norwegian Patient Registry (NPR)[2]

The Norwegian Patient Registry includes individual level information on all contacts with specialist health-care services. Information registered includes admission and discharge dates, and diagnostic codes during the hospital stay/outpatient contact. These codes are according to the International Classification of Diseases version 10. We used these codes to identify miscarriages and underlying health conditions (Table S1 and Table S2).

The Norwegian Registry for Primary Health Care (KPR)[2]

All Norwegian residents are assigned a primary care physician for care, which is universally publicly funded. The physician obtains reimbursements for consultation by reporting the date, the reimbursement code for payment of services, and medical diagnoses for each patient contact. The diagnoses are coded according to the International Classification of Primary Care version 2. We used codes for miscarriage and confirmation of a pregnancy, and codes for underlying health conditions (Table S1 and Table S2).

Norwegian Surveillance System for Communicable Diseases (MSIS)[3]

There is mandatory reporting of selected infectious diseases to this National Health register. Reporting of all Covid-19 tests is mandatory, and this register contains date of testing and test results.

Statistics Norway (SSB)

Administrative data are mandatorily reported to Statistics Norway. We used information from this database on household income in 2018, type of education and years of education completed by 2019.

The Medical Birth Registry of Norway (MBRN)[4]

The Norwegian national birth registry includes information on all pregnancies ending after completion of gestational week 12 or later. The registry includes information on birth outcomes in addition to maternal background characteristics, health during pregnancy, pregnancy outcomes and neonatal health. We used the birth register to exclude fetal losses after week 14.. As registrations in the NPR and KPR do not include the gestational age, we also used data from the birth registry on gestational age at birth for pregnancies completed in 2020 to estimate gestational week of first registration of W78 (confirmation of pregnancy). For pregnancies later registered in the birth registry, most registrations of W78 were made in pregnancy weeks 7-9 (Figure S1). Gestational age in the birth registry is based on routine ultrasound assessments at around 18 gestational weeks provided to all pregnant women, or last menstrual period if ultrasound assessments are lacking.

Ethical approval

The study was approved by The Regional Committee for Medical and Health Ethics of South/East Norway (reference number 141135), which waived the need for consent from participants in this registry-based study.

Study population

We identified all women registered with a miscarriage in the first trimester or a confirmation of an ongoing pregnancy between February 15th and August 15th, 2021 through Norwegian registries. We used three mandatory National health registries to identify pregnant women: The Norwegian Registry for Primary Health Care, the Patient Registry, and the Medical Birth Registry of Norway. Miscarriages were identified by ICPC-2 code W82 ("Spontaneous abortion") in the primary care database Care or ICD-10 codes O02 ("Other abnormal products of conception"), and O03 ("Spontaneous abortion") in the Patient Registry, while the birth registry provided information on miscarriage occurring between 12 and 14 completed gestational weeks (Table S1). Primary care visits for confirmation of ongoing pregnancies were identified in the primary care database by the ICPC-2 code W78 ("Confirmed pregnancy"). The index date was the first registration of a miscarriage or confirmation of an ongoing pregnancy. Induced abortions were not included in this study.

Identification of first-trimester miscarriages (cases)

We defined first-trimester miscarriage as a spontaneous fetal loss that occurred before 14 completed gestational weeks. The birth registry contributed information on miscarriages which occurred during gestational weeks 13 and 14. We used the patient registry and primary care database to identify miscarriages that occurred before 12 completed weeks. The administrative codes used to identify miscarriages in these databases are shown in Table S1. None of these codes include induced abortions, which were excluded from our analyses. Since registered miscarriages in the patient registry and the primary care database do not include information on gestational length, we ensured they did not occur within a pregnancy registered in the birth registry. We considered miscarriages to have occurred before 12 completed gestational weeks when they were not registered in the birth registry, in which registrations start at gestational week 12. In order to ensure that two separate registrations in the patient registry or primary care database did not reflect the same pregnancy, we also required at least 42 days between the day of a completed pregnancy in the birth registry and the registration of a miscarriage in the patient registry, or at least 90 days between the day of a completed pregnancy in the birth registry and registration of a miscarriage in primary care. Women in primary care have more follow-up visits after normal pregnancies, and so a longer interval is required. This process should identify all recorded miscarriages in Norway occurring prior to 14 completed gestational weeks. The date of the occurrence of the miscarriage contains some degree of uncertainty, since the fetal demise could have occurred within a few days prior to the registration in the health-care system. Notably, we were only able to evaluate miscarriages which resulted in contact with health-care services, and could not include miscarriages which occurred before a woman realized she was pregnant or which did not require medical care.

Identification of ongoing confirmed pregnancies (controls)

Among all completed pregnancies in the birth registry in 2020 with known last menstrual period date, approximately 41% could be identified as having a date of primary-care confirmation of pregnancy (ICPC-2 code W78). Not all pregnant women receive this confirmation as many women use home pregnancy testing only. However, among all registered births in the birth registry in 2020, characteristics of women with this code for confirmation of an early pregnancy in primary care were similar to those without this code (Table S4), when comparing characteristics registered at birth. We used the date of clinical confirmation or miscarriage as the index date for analysis.

Covid-19 vaccination

Covid vaccination is not recommended in Norway in the first trimester of pregnancy, except in women with high risk conditions.[5] Type of Covid-19 vaccine and vaccination dates (for first and subsequent doses) must be reported to the Norwegian Immunization Register. We used data on vaccinations occurring within a 5- and 3-week exposure window prior to the index date (date of miscarriage or date of confirmation of an ongoing pregnancy). Vaccinations on the index date itself were not included. We first combined all Covid-19 vaccines, and subsequently examined the Pfizer-BioNTech, Moderna and the AstraZeneca vaccine separately. No other Covid-19 vaccines have been available in Norway. Finally, we assessed associations with miscarriage after a first or second dose of vaccine.

Covariates

We obtained information from national registries on covariates that could be potential confounders. From the Population Register and Statistics Norway we obtained maternal age (continuous), country of birth (Norway, other Scandinavian countries (Sweden and Denmark) or non-Scandinavian countries), marital status (single,

married/cohabitating, or other), highest educational level as of 2019 (elementary school, high-school, vocational, up to 4 years of higher education, and more than 4 years of higher education), household income in 2018 (in tertiles), parity (all stillbirths and live births; 0, 1, 2 or more), and whether the woman was health-care personnel (yes versus no). Information on a positive SARS-CoV-2 test was drawn from the Norwegian Surveillance System for Communicable Diseases. Underlying risk conditions for covid-19 (organ transplant, neurological disorders, kidney failure, diabetes, chronic lung disease, hematological cancer, other cancers, immunodeficiency-reduced immune function, cardiovascular disorders, cerebrovascular disease) were obtained from the Patient Register and the general practitioner database (diagnostic codes are listed in Table S2). To be included as a covariate, a diagnostic code must have been noted on at least two health-care visits between January 2017 and the end of the study period. To account for potential influence of unmeasured seasonal and other time-related factors, we also adjusted for calendar month of the index date of miscarriage or confirmed pregnancy.

Statistical analysis

Using logistic regression, we estimated odds ratios (OR) and 95% confidence intervals (CI) for Covid-19 vaccination within 5-week and 3-week windows prior to the index date. Multivariable analyses adjusted for maternal age, country of birth, marital status, educational level, household income, parity, health care professional, underlying risk conditions for covid-19, previous positive test for SARS-CoV-2, and calendar month. Age was entered as a continuous variable, while other covariates were categorical and entered using the appropriate number of dummy variables. For the few variables with missing information, we used "unknown" as a separate category; we did not conduct multiple imputation because the unknown category was considered to be a unique group. For example, those with unknown education are likely to have completed their education abroad, and those with unknown income level are likely to not have permanent residence in Norway. We subsequently stratified our model by type of vaccine, and whether the vaccination was first or second dose. We also conducted sensitivity analyses restricted to health-care personnel to explore the potential role of unmeasured confounding. Women who are health professionals were more likely to be vaccinated and their vaccination behavior was less likely to be influenced by other unmeasured characteristics. The Hosmer and Lemeshow's goodness-of-fit test also indicated that our model fit the data well ($p>0.4$). The values for the Pregibon (1981) Delta-Beta influence statistic were all below 0.09. Only 1% of the observations had a value >0.01. Sensitivity analyses excluding this one percent of the observations yielded similar results. As some pregnancies which were confirmed towards the end of the study period could have ended in a miscarriage after follow-up, we also conducted sensitivity analyses restricting to pregnancies with at least 8 weeks follow up after first registration. This analysis was restricted to pregnancies with an index date prior to June 20th, 2021. The results were similar to what was observed in the main analysis (Table S7).

All analyses were conducted using Stata version 16 (Statacorp, Texas).

Limitations

Limitations include lack of information on gestational age at the time of registrations. We could not confirm the exact gestational week that vaccination during pregnancy occurred. However, since we knew the date of vaccination and the index date, our approach was to estimate odds of vaccination in the five weeks or three weeks prior to the index date. It is unlikely that many miscarriages were registered before reaching 5-6 weeks of gestation, thus a window of five weeks prior to index date likely to reflect a dose received during pregnancy. As described above, pregnancies registered after gestational week 14 in the birth registry were excluded, which should ensure that miscarriages in this study occurred between before week 14.

Second, based on data on completed pregnancies from 2020, we were likely able to include only approximately 40% of ongoing pregnancies in our control group. We were able to show, based on 2020 data, that underlying background characteristics among completed pregnancies with and without this code were similar (Table S4), which reduces concern about differential selection of controls with different characteristics introducing potential selection bias.

Third, there are limited data on potential confounders in the registries, and unmeasured factors which are related to both vaccination and miscarriages may result in unmeasured confounding, In particular, unmeasured lifestyle characteristics such as smoking and body-mass index, are not captured in the Norwegian national health registries. Still, adjustment for a range of factors which are mandatory to register in the national data bases, including income and educational level, did not have a large impact on estimates. Also, analyses restricted to health care personnel yielded similar results. This group of women were prioritized and urged to receive

vaccination, although the general recommendations for vaccination during pregnancy (i.e. to be vaccinated in 2. and 3. Trimester) was also the recommendations for health care personnel. The women in this study were likely to be vaccinated before they knew they were pregnant. Since health care workers were more likely to be vaccinated, their vaccination status is less likely to be influenced by other characteristics and unmeasured factors. Still, it is possible that unmeasured factors might mask or attenuate an increased risk with vaccination, if vaccinated women had a higher prevalence of unmeasured factors associated with a lower risk of miscarriage, or a lower prevalence of a factor associated with a higher risk of miscarriage relative to unvaccinated women. Previous studies looking at influenza vaccination have described this potential "healthy vaccination" bias.[6,7]

Table S1. Diagnostic codes used to identify pregnancies

Miscarriage		
Specialist care		
Patient Registry	Pregnancies with abortive outcome	
	O02	Other abnormal products of conception*
	O03	Spontaneous abortion
Medical Birth Registry		Registered fetal loss after 12 completed gestational weeks through 14 completed gestational weeks
Primary care	ICPC-2 code	
	W82	Spontaneous abortion
Ongoing pregnancy		
Primary care	W78	Pregnancy confirmed

*O02 does not include induced abortions.

Table S2. Diagnostic codes registered from January 2017 through February 2021 used to identify underlying health conditions.

Risk condition	ICD-10	ICPC2
Organ transplant	Z94.0, Z94.1, Z94.2, Z94.3, Z94.4, Z94.8	
Neurological disorders	G1, G20, G21, G23, G24, G40.5, G61.0, G70, G71, G80.0, G80.2, G80.3, F72, F73, F84.0, F84.1, Q05.0, Q05.1, Q05.2, Q05.3, Q05.04, Q05.5, Q05.6, Q90	
Kidney failure	N18.3, N18.4, N18.5	
Diabetes	E10, E11, E12, E13, E14	T89, T90
Chronic lung disease	J41, J42, J43, J44, J45, J46, J47, J84, J98, E84	R95, R96
Hematological cancer	C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, D45, D45, D47	
Other Cancers	C0, C1, C2, C3, C4, C5, C6, C7, C80, D32, D33, D35.2, D35.3, D35.4, D42, D43, D44.2, D44.3, D44.4,	
Immunodeficiency	D80, D81, D82, D83, D84	
Reduced immune function	G35, M05, M08, M06, M07, M09, M13, M14, K50, K51	
Cardiovascular disorders	I05, I06, I07, I08, I09, I2, I31, I32, I34, I35, I36, I37, I39, I40, I41, I42, I43, I46, I48, I49, I50	K74, K75, K76, K77, K78, K82, K83, K87
Cerebrovascular disease	I60, I61, I62, I63, I64, I69.1, I69.2, I69.3, I69.4, I69.8, I69.0	K90, K91

Table S3. Characteristics of women with a first-trimester miscarriage or a confirmation of an ongoing pregnancy between February 15 and August 15, 2021, in Norway, according to Covid-19 vaccination status.

Characteristic	Ongoing pregnancies (controls)		Miscarriages (cases)	
	Unvaccinated (n= 13,184)	Vaccinated (n=772)	Unvaccinated (n=4290)	Vaccinated (n=231)
Mean maternal age, years (SD)	30.8 (5.0)	30.6 (5.4)	32.4 (5.6)	31.1 (6.4)
Parity, no. (%)				
0	8057 (61.1)	488 (63.2)	2644 (61.6)	155 (67.1)
1	3356 (25.5)	183 (23.7)	1010 (23.5)	45 (19.5)
2 or more	1771 (13.4)	101 (13.1)	636 (14.8)	31 (13.4)
Country of birth, no. (%)				
Norway or other Scandinavian countries	9720 (73.7)	626 (81.1)	3131 (73.0)	186 (80.5)
Outside Scandinavia	3427 (26.0)	142 (18.4)	1147 (27.0)	45 (19.5)
Unknown	37 (0.3)	4 (0.5)	12 (0.3)	0 (0)
Marital status, no. (%)				
Married/cohabitating	4501 (34.1)	214 (27.7)	1592 (37.1)	61 (26.4)
Other	8683 (65.9)	558 (72.3)	2698 (62.9)	170 (73.6)
Educational level, no. (%)				
No higher education	5154 (39.1)	232 (42.2)	1641 (38.3)	100 (43.3)
≤4 years of higher education	4597 (34.9)	207 (37.6)	1531 (35.7)	70 (30.3)
> 4 years of higher education	2327 (17.7)	74 (13.5)	783 (18.3)	48 (20.8)
Unknown	1106 (8.4)	37 (6.7)	335 (7.8)	13 (5.6)
Income level, no. (%)				
Lowest tertile	4301 (32.6)	272 (35.2)	1469 (34.9)	90 (39.0)
Middle tertile	4200 (31.9)	227 (29.4)	1353 (31.5)	72 (31.2)
Highest terile	4211 (31.9)	253 (32.8)	1298 (30.3)	67 (29.0)
Unknown	472 (3.6)	20 (2.6)	143 (3.3)	2 (0.9)
Underlying health condition, no (%)	1195 (9.1)	119 (15.4)	390 (9.1)	28 (12.1)
Health care profession, no. (%)	2419 (18.4)	261 (33.8)	756 (17.6)	75 (32.5)
Previous positive SARS-CoV-2 test, no. (%)	381 (2.9)	14 (1.8)	130 (3.0)	6 (2.6)
Calendar month of index date*				
February	1570 (11.9)	9 (1.2)	387 (9.0)	5 (2.2)
March	2986 (22.7)	78 (10.1)	972 (22.7)	22 (9.5)
April	2495 (18.9)	32 (4.2)	836 (19.5)	8 (3.5)
May	1989 (15.1)	85 (11.0)	545 (12.7)	29 (12.6)
June	2068 (15.7)	172 (22.3)	660 (15.4)	38 (16.5)
July	1377 (10.4)	216 (28.0)	589 (13.7)	72 (31.2)
August	699 (5.3)	180 (23.3)	301 (7.0)	57 (24.7)

*Date of registered miscarriage or first confirmation of an ongoing pregnancy

Table S4. Characteristics of women with and without a consultation for "confirmation of pregnancy" (ICPC code W78) in primary care among all births in the Norwegian birth registry in 2020.

	Pregnancies in the birth registry in 2020	
Characteristic	Without W78 (n= 31,328)	With W78 (n=22,088)
Mean maternal age - years (SD)	31.4 (4.6)	31.1 (5.0)
Parity - no. (%)*		
0	12,585 (40.2)	10,317 (46.9)
1	12,385 (39.5)	7,549 (34.2)
2 or more	6,359 (20.3)	4,142 (18.8)
Country of birth - no. (%)		
Norway or other Scandinavian countries	22,700 (72.5)	15,804 (71.8)
Outside Scandinavia	7,983 (25.5)	6,147 (27.9)
Unknown	645 (2.1)	57 (0.3)
Marital status, no. (%)		
Married/cohabitating	13,719 (43.8)	9,215 (41.9)
Other	18,075 (54.5)	12,793 (58.1)
Missing	534 (1.7)	0
Educational level, no. (%)		
No higher education	9,543 (30.5)	8,117 (36.9)
Up to 4 years of higher education	11,793 (37.6)	7,841 (35.6)
> 4 years of higher education	6,765 (21.6)	4,185 (19.0)
Unknown	3,227 (10.3)	1,865 (8.5)
Income level, no. (%)		
Lowest tertile	9,179 (29.3)	7,791 (35.4)
Middle tertile	10,002 (31.9)	6,956 (31.6)
Highest tertile	10,407 (33.2)	6,513 (29.6)
Unknown	1,740 (5.6)	749 (3.4)
Underlying health condition - no (%)	1107 (9.1)	99 (18.0)
Health care profession - no. (%)	5,607 (17.9)	3,913 (17.8)
Pre-pregnancy body-mass index		
Underweight (<18.5 kg/m^2)	994 (3.2)	693 (3.2)
Normal weight (18.5-24.9 kg/m^2)	17,251 (55.1)	11,601 (52.7)
Overweight (25.0-29.9 kg/m^2)	6,696 (21.4)	4,806 (21.8)
Obese (≥ 30 kg/m^2)	3,761 (12.0)	3,114 (14.2)
Unknown	2,626 (8.4)	1,794 (8.2)
Maternal smoking at beginning of pregnancy		
No	26,506 (84.6)	18,405 (83.6)
Occasionally	581 (1.9)	470 (2.1)
Daily	993 (3.2)	878 (4.0)
Unknown	3,248 (10.4)	2,255 (10.3)

*Previous stillbirths and live births registered in the birth registry.

Table S5. Odds ratio (OR) for Covid-19 vaccination with different Covid-19 vaccines in a 5-week window before miscarriage or confirmation of an ongoing pregnancy.

Type of vaccine	Ongoing pregnancy	Miscarriage	Unadjusted		Adjusted*	
	No.	No.	OR	95% CI	OR	95% CI
Pfizer-BioNTech						
Not vaccinated	13,184	4290	1.00		1.00	
Vaccinated	609	181	0.91	0.77 to 1.08	0.80	0.67 to 0.96
Moderna						
Not vaccinated	13,184	4290	1.00		1.00	
Vaccinated	103	34	1.01	0.69 to 1.50	0.84	0.56 to 1.25
AstraZeneca						
Not vaccinated	13,184	4290	1.00		1.00	
Vaccinated	60	16	0.82	0.47 to 1.42	0.84	0.48 to 1.48

*Adjusted for age, country of birth, marital status, educational level, household income, parity, risk conditions for covid-19, and previous positive SARS-CoV-2 test. Model with total participants adjusted for health care profession

Table S6. Odds ratio (OR) for Covid-19 vaccination in a 5-week window before miscarriage or confirmation of an ongoing pregnancy according to number of doses received.

	Vaccination status											
	One dose						Two doses					
	Ongoing pregnancy	Mis-carriage	Unadjusted		Adjusted*		Ongoing pregnancy	Mis-carriage	Unadjusted		Adjusted*	
	No.	No.	OR	95% CI	OR	95% CI	No.	No.	OR	95% CI	OR	95% CI
All												
Vaccinated												
No	13,184	4290	1.00		1.00		13,184	4290	1.00		1.00	
Yes	539	163	0.93	0.78 to 1.11	0.78	0.65 to 0.94	233	68	0.90	0.68 to 1.18	0.88	0.67 to 1.17
Health care personnel												
Vaccinated												
No	2419	756	1.00		1.00		2419	756	1.00		1.00	
Yes	133	38	0.91	0.63 to 1.32	0.87	0.60 to 1.28	128	37	0.92	0.64 to 1.35	0.99	0.67 to 1.46

*Adjusted for age, country of birth, marital status, educational level, household income, parity, risk conditions for covid-19, and previous positive SARS-CoV-2 test. Model with total participants adjusted for health care profession.

Table S7. Odds ratio (OR) for Covid-19 vaccination in a 5- or 3-week window before miscarriage or confirmation of an ongoing pregnancy with at least 8 weeks follow up after being confirmed.

	5 Week Exposure Window						3 Week Exposure Window					
	Ongoing pregnancy	Mis-carriage	Unadjusted		Adjusted*		Ongoing pregnancy	Mis-carriage	Unadjusted		Adjusted*	
	No.	No.	OR	95% CI	OR	95% CI	No.	No.	OR	95% CI	OR	95% CI
All												
Vaccinated												
No	10,313	3158	1.00		1.00		10,426	3186	1.00		1.00	
Yes	317	86	0.89	0.70 to 1.13	0.94	0.73 to 1.21	204	58	0.93	0.69 to 1.25	0.99	0.73 to 1.33
Health care personnel												
Vaccinated												
No	1846	517	1.00		1.00		1927	532	1.00		1.00	
Yes	197	49	0.89	0.64 to 1.23	0.88	0.62 to 1.23	116	34	1.06	0.72 to 1.57	1.01	0.67 to 1.51

*Adjusted for age, country of birth, marital status, educational level, household income, number of children, risk conditions for Covid-19, and previous positive test for Sars-CoV-2. Model with total participants adjusted for health care profession.

Figure S1. Gestational week of first confirmation of an ongoing pregnancy in primary care among all completed pregnancies in 2020 registered in the birth registry.

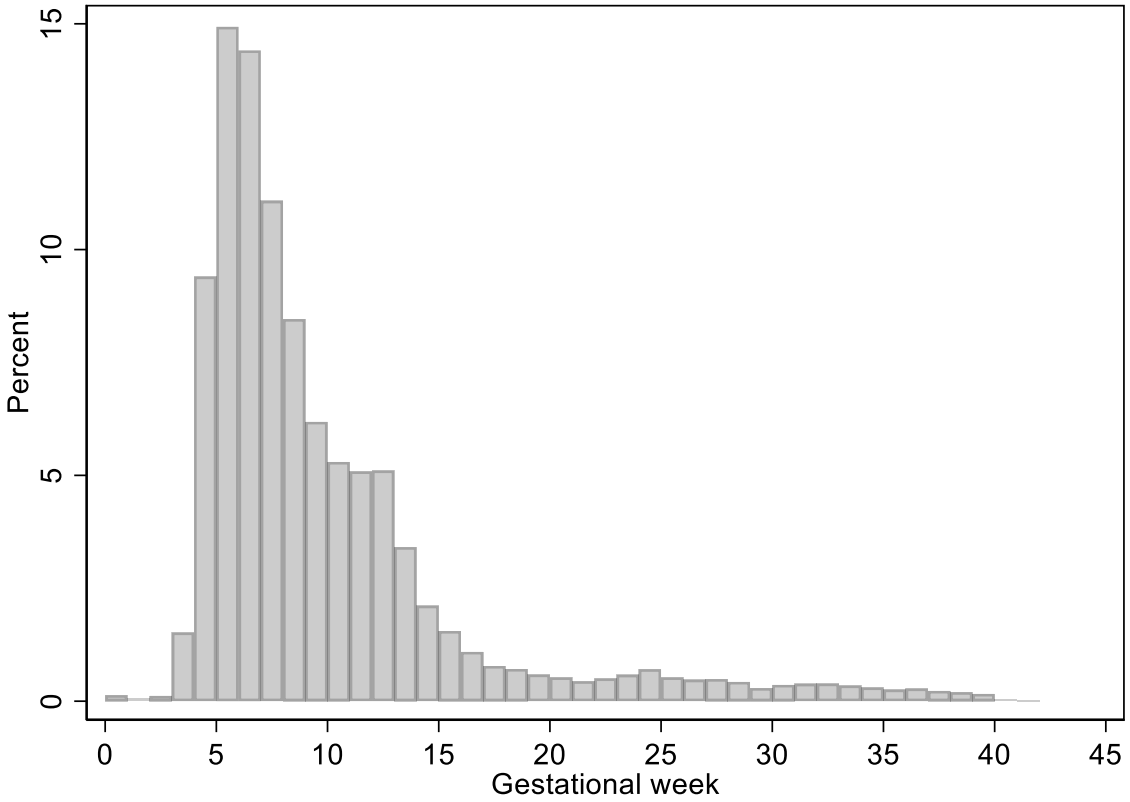
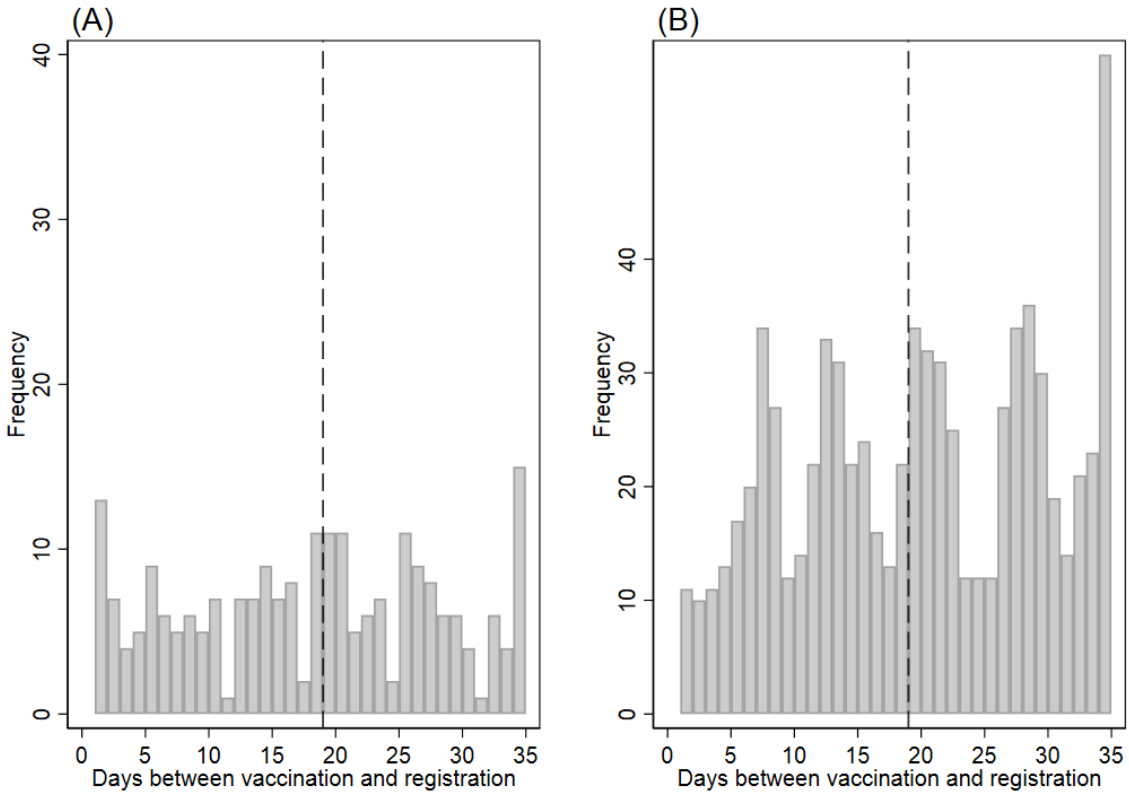


Figure S2. Number of days from vaccination to miscarriage or confirmation of an ongoing pregnancy. Dashed line indicates median number of days.
A: Miscarriage (cases)
B: Ongoing pregnancy (controls)



References

1. Norwegian Institute of Public Health. Emergency preparedness register for COVID-19 (Beredt-C19). (https://www.fhi.no/en/id/infectious-diseases/coronavirus/emergency-preparedness-register-for-covid-19/).
2. Bakken IJ, Ariansen AMS, Knudsen GP, Johansen KI, Vollset SE. The Norwegian Patient Registry and the Norwegian Registry for Primary Health Care: Research potential of two nationwide health-care registries. Scand J Public Health 2020;48(1):49-55.
3. Norwegian institute of Public Health. Norwegian Surveillance System for Communicable Diseases (MSIS). (https://www.fhi.no/en/hn/health-registries/msis/).
4. Norwegian Institute of Public Health. The Medical Birth Registry of Norway (MBRN). (http://www.fhi.no/eway/default.aspx?pid=240&trg=Main_6664&Main_6664=6898:0:25,7840:1:0:0:::0:0).
5. Norwegian institute of Public Health. Updated vaccine recommendations for pregnant women. Aug. 18, 2021 (https://www.fhi.no/en/news/2021/updated-vaccine-recommendations-for-pregnant-women/).
6. Savitz DA, Fell DB, Ortiz JR, Bhat N. Does influenza vaccination improve pregnancy outcome? Methodological issues and research needs. Vaccine 2015;33(47):6430-5.
7. Vazquez-Benitez G, Kharbanda EO, Naleway AL, et al. Risk of Preterm or Small-for-Gestational-Age Birth After Influenza Vaccination During Pregnancy: Caveats When Conducting Retrospective Observational Studies. Am J Epidemiol 2016;184(3):176-86.